The safe use of refuse collection vehicle hoists and bins

Introduction

1 This 'good practice' guidance was written in consultation and with the support of the Waste Industry Safety and Health Forum (WISH). It does not aim to be comprehensive but gives examples of good practice within the indsutry.

2 It is written for users, manufacturers and suppliers of vehicle hoists and wheeled bins, for the collection of domestic and trade waste.

3 It does not intend to interpret the law, nor does it aim to be comprehensive, or imply a preference for any specific waste collection system, but contains notes on good practice which you may find helpful in considering what you need to do. Your risk assessment may reveal other matters which require attention.

4 It gives examples of risks of injury to workers and members of the public, and indicates some protective measures and safe operating procedures that can be used to minimise these risks. Some short-term solutions to reduce risks from existing incompatibilities are included in this guidance.

5 The industry continues to address incompatibilities of design and manufacture between:

- bins;
- hoists; and
- the ways in which both are used.

6 Future, longer-term solutions (eg changes to design and manufacturing standards) will be added to this guidance as they become available.

Application

7 Wheeled refuse collection bins (both domestic 'wheelie bins' and larger-sized trade waste bins) and vehicle-mounted hoists have been in use in the UK since the mid-1980s. Despite technological developments and collective experience with this equipment, significant numbers of serious accidents, including deaths, still occur. In many cases, the underlying causes have not always been identified, or solutions effectively applied to minimise the risks.

Common causes of injury

8 The most common reports of injuries involving wheeled waste bins (of all sizes) and vehicle-mounted hoists are:

Waste collector (loader) struck by the waste bin, still attached to the hoist, as it returns to ground level

Case study: A refuse collection worker was at the vehicle's side-mounted control panels when the raised bin lid fell off and struck the stop button on the other side of the vehicle. As he walked under the raised bin to release the stop button, his colleague released it from the other side of the vehicle, and proceeded to lower the hoist. The collection worker was crushed between the bin and the ground, sustaining injuries as a result.

Waste collector struck by a bin falling from the hoist

Case study: A 1100 litre waste bin fell from a top-loader hoist, killing the loader. Investigation revealed that, depending on the type of waste in the bin, the full weight of the bin may exceed both its own and the hoist's safe working load (SWL). Collectors require a simple method to determine if the total load of the bin and contents are within SWLs for both the bin and hoist. In addition, any incompatibility between the bin and hoist exaggerates the risk of the bin being released during the tipping cycle.

Waste collector becoming entangled in the hoist during the tipping cycle

Case study: A seasonal collection worker was seriously injured when he was crushed by the hoist as it descended. He may have been attempting to stop the hopper overflowing by pushing waste back into the hopper while the bin was tipped. Information, training and supervision provided for seasonal workers should be suitable to ensure safe loading.

Case study: A refuse collection worker was seriously injured when his foot was crushed in the hoist of a refuse collection vehicle. He stood on the hoist clamp bar so that he could be raised to remove lodged waste that was preventing the vehicle compartment roof from closing. Systems of work were not suitable to ensure that jams in the hopper and hoist mechanisms were cleared safely. Information, training and supervision was insufficient to ensure that a safe system was followed.

Waste collector injured when releasing a waste bin 'hung up' on the hoist, or lost in the back of the hopper

Case study: A collection worker climbed onto the hoist to remove a waste bin that had fallen into the hopper when he slipped and fell from the back of a refuse collection vehicle. Collectors did not have clear instructions not to climb onto hoists, and the on-call system was not able to provide back-up staff to deal safely with such problems. Monitoring and supervision was not sufficient to ensure safe systems of work were adhered to.

9 Other accidents recorded include:

- collectors injured when moving the waste bin to or from its storage place to the vehicle;
- collectors and members of the public struck by reversing vehicles (see ***Waste and recycling vehicles in street collection***[1]);
- collectors and members of the public struck by vehicles moving forwards;
- workers injured and killed when they fall while riding on the outside of a moving vehicle.

Risks

10 A suitable and sufficient risk assessment should include all of the significant risks relating to collection of waste in wheeled waste bins (see Appendix 1). A step-by-step assessment of the work carried out by the collection team may identify significant risks arising from:

11 Moving the waste bin:

- the manual handling risks from moving the bin to and from its normal storage area, including the effects of size and weight of the bin;
- the effects of the surfaces it travels over; and
- the effects of design or maintenance of the bin and its wheels.

12 Use of the hoist:

- loading onto and removing the waste bin from the hoist, including:
  - the effects of the size and weight of the bin and its contents;
  - flexing due to excess weight;
  - work organisation, eg the order in which bins are loaded onto the hoist;
- incompatibilities between the bin and the hoist; and
- inadequate maintenance of the bins and hoists.

13 Other significant factors, eg human factors:

- work organisation, eg who operates the hoist controls;
- entering the lifting zone while tipping;
- shaking the bin with the hoist, to release compacted waste; and
- climbing onto vehicles to release bins that have 'hung up' on the vehicle at the top of the tipping cycle.

Design and compatibility of equipment

Design of waste bins, hoists and vehicles

14 Harmonised European standards are either available, or are currently being prepared, to provide guidance on compatibility of equipment for designers, manufacturers and suppliers of wheeled waste bins, hoists and vehicles. These include:

- BS EN 1501-1: 1998[2] - guidance on the design of hoists and their attachment to refuse collection vehicles;
- BS EN 840 Parts 1-6: 2004[3] - guidance on the design of waste bins;
- pr EN 1501-5[4] (a draft) - guidance on the integration of the refuse collection vehicle and lifting device (hoist), and the lifting device and designated waste bin.

15 Vehicle manufacturers are continually investigating means (eg the use of proximity sensing devices) to reduce the risks to workers from waste bins descending on the hoist. Until suitable engineering solutions become available, users of the equipment should institute a suitable system of work to minimise the risk of collision between the worker and the equipment (see paragraphs 54-56).

Equipment compatibility: matching waste bin and hoist

16 When purchasing new and replacement equipment, users should take account of prevailing Standards, and ensure that the waste bins and hoists they choose are fully compatible with each other.

17 This can be achieved, for example, by including specifications:

- in equipment purchasing policies, where the equipment is directly owned;
- in service tenders and contracts where some or all of the waste collection service is provided by contractors.

18 Where relevant standards are specified in tenders and contracts, then clients and contractors should ensure that the equipment provided for waste collection meets the requirements of those Standards.

19 Currently, a number of different designs of waste bins and hoists are in service. Although compatible, they may require specific and precise adjustments to the lifting mechanism to ensure that the bin is held in place effectively during the tipping cycle. Special attention should be paid to the requirements for maintaining the condition of bins and hoists, to ensure that compatibility can be maintained in use (see paragraphs 43-53).

Choosing hoists and bins

20 New CE-marked hoists and bins should conform to the requirements of BS EN 1501-1: 1998[2] and BS EN 840 Parts 1-6: 2004.[3] The requirements of pr EN 1501-5[4] should also be considered when integrating new or existing vehicles, hoists and bins. Generic requirements for waste collection equipment are given below, but reference should be made to the relevant Standards for more detailed information before choosing or modifying equipment.

Hoists

21 The hoist should be designed for designated waste bins and for the maximum possible load of the bins chosen (see BS EN 840: 2004[3]). The safe working load (SWL) should be clearly displayed on the vehicle, close to the hoist.

22 Monitoring devices (ie devices that detect bin position in the hoist and measure the referenced height of the bin) should limit automatic or semi-automatic lifting to 400 mm, if the bin is not correctly located in the hoist.

23 Automatic or semi-automatic lifting should not be possible without interlocked barriers in place, to prevent workers entering the movement zone from the sides.

24 The peripheral speed of the hoist (outermost point when tipping) should not exceed 2.5 m/s for bins with a capacity of less than 2500 l, and 1.5 m/s for bins with a capacity greater than 2500 l, when measured from a standard point less than 2500 mm from ground level.

Hoist/vehicle interface

25 Where hoists and hopper compactors can operate simultaneously, there should be some means of preventing a collision between the two.

26 Any crushing or shearing hazards should be eliminated by design of the hoist or, where there is any residual risk, by suitable guarding (see BS EN 349: 1993[5]).

27 To prevent foot injuries, the distance between ground level and the normal lowest point of the hoist should be at least 120 mm. If the hoist needs to be lowered to ground level, a hold-to-run control should be provided in a position on the vehicle where the hoist is in full view.

Controls

28 Hoist operating controls should be mounted in a safe place outside the hoist and bin movement zone.

29 Hoist controls should be protected against accidental operation and arranged so that the operation of the controls mimics the direction of hoist movement, (eg the upper button for 'lift' and the lower button for 'lower').

30 The hoist should stop when the manual hold-to run control is released.

31 Switching from manual to automatic mode should only be possible with the hoist in the lowest position and should not initiate lifting. Automatic mode should be cancelled by switching to manual mode.

32 At least two clearly identifiable emergency stop devices should be provided which:

- stop the hoist immediately when used;
- are accessible from either side of the vehicle;
- have a clear view of the hoisting zone;
- have an acoustic signal, which sounds in the driver's cab when the emergency stop is activated;
- prevent automatic restart without manual resetting.

Hydraulics

33 Hoists should have hose burst protection valves mounted directly on the lifting rams.

34 All hydraulic hoses and fittings should have a safety factor of at least twice the normal working pressure. Where hoses are located within 500 mm of the normal working area, workers should be shielded from the sudden failure of a hose, with protection that is sufficiently sturdy to stop or divert fluids away.

35 The hydraulic power system should comply with the requirements of BS EN 982: 1996.[6]

Bins

36 Reference should be made to BS EN 840-6: 2004 *Mobile waste bins Part 6: Safety and health requirements*,[3] when considering:

- shape and positioning of handles;
- type and positioning of wheels;

- fitting of direction blocks (to assist steering of wheels);
- type and positioning of brakes;
- type and positioning of lids;
- and to manufacturers' and suppliers' instructions for correct choice, correct maintenance and safe use of bins.

37 Those conforming to BS EN 840 Parts 1-63 should have a certificate issued within six months of the date of purchase by a known and approved test facility.

38 They should be designed and built so that, when filled with an appropriate load, they

- fit securely into a compatible hoist (BS EN 1501-1: 1998[2]);
- can be locked into the hoist during the tipping cycle (see pr EN 1501-5[4]).

39 They should fit safely onto the hoist without having to be manually carried or lifted.

40 They should be designed and built to minimise the pushing and pulling forces required to move them (BS EN 840-5: 2004[3]). They should make best use of shape, size, centre of gravity, low rolling resistance and likely positioning of load, when positioning wheels and handles.

41 Four and two-wheeled bins should have suitable handles that give workers a safe, two-handed grip when pushing, pulling and manoeuvring them.

42 Sharp edges which could cause injury should be eliminated by design of the bin.

Equipment maintenance

43 Regular, routine, scheduled cleaning, lubrication, examination and maintenance schedules are important.

44 Keeping accurate completed service and maintenance work records on hoists and bin stock currently in service permits patterns of deterioration, and its causes, to be established.

45 Routine maintenance regimes can improve safety and reduce business losses by:

- identifying faults before catastrophic failure;
- permitting repairs before the equipment becomes unserviceable;
- identifying incompatibilities or misuse, and permitting remedial action to be taken, especially where there are:
  - problems with the interface between hoists and bins;
  - equipment used in an inappropriate environment;
  - abuse of equipment.

Hoists

46 To ensure continued safe operation of the hoist, servicing and maintenance schedules for refuse collection vehicles should also include planned servicing and maintenance of the hoist, following the instructions provided by the manufacturer or supplier.

47 Where faults affecting safe use of the hoist are identified, arrangements should also be made for prompt reporting, logging and timely repair. Written instructions

for staff should include the extent of non-specialist preventative maintenance work which can be carried out as part of routine service or repair, and agreed work that should be referred to specialists in hoist maintenance.

48 The hoist (including any wire ropes or chains which form part of its mechanism) should also be regularly inspected and thoroughly examined by an independent person competent to carry out the statutory requirements under the Lifting Operations and Lifting Equipment Regulations 19987 (LOLER).

Bins

49 Safe lifting of bins relies upon effective engagement of the bin with the hoist and the structural integrity of the bin throughout the emptying cycle.

50 In the absence of an effective maintenance regime, bin failures due to wear are often only identified when bins are inadvertently released from the hoist.

51 Routine planned examination of bin stock in service should use the manufacturer or suppliers instructions to identify bins which are likely to:

- fail during the emptying cycle, (eg fall from the hoist due to flexing around the rim of the bin);
- 'hang-up' during the emptying cycle (eg when damaged lids catch on the hoist/vehicle structure).

52 Arrangements should be made for prompt reporting and replacement of bins that have been identified as unacceptably worn or faulty.

53 Repairs and maintenance to bins should use parts and materials specified in the manufacturer's instructions, or exhibit equivalent or superior performance standards, and be in accordance with the original BS EN 840 Parts 1-6[3] specification.

Safe use of equipment

54 To address the residual risks from the use of bins and hoists, users should implement suitable safe systems of work for collection teams. The systems of work should complement the engineering controls for safe use of hoists and bins, and the practical requirements of the collection round.

55 Written method statements should address:

- manual handling issues, including safe movement of waste bins (eg over problematic terrain including kerbs, steps, slopes, cobbles etc);
- restrictions, for each type of bin used, on the:
  - type of waste;
  - maximum weight;
  - amount of compaction;
- situations where the bin should not be presented for tipping, (eg unacceptable contents or overfull);
  - situations under which it is (or is not) appropriate to use manual, semi-automatic and automatic tipping modes;
- work sequences for placing bins onto hoists eg:
  - both bins taken off a dual-lift hoist before another bin is put on; and
  - agreement on which worker takes responsibility for selecting manual, semi-automatic and automatic modes and operating the controls;
- safe standing positions for workers during the tipping cycle including information on the risk zones eg:

  - the lifting arc of the hoist;
  - under the bin;
  - when it is in the raised position etc;
- safe bin retrieval arrangements, including:
  - bins 'hung up' on the top of the vehicle (eliminating the need to climb on the vehicle); and
  - bins fallen into the hopper.

56 These arrangements may include, for example, provision of portable unhooking devices and safe systems of work, specialist back-up support arrangements for crew etc).

Information, instruction, training, supervision and staff consultation

57 The Provision and Use of Work Equipment Regulations 19988 (PUWER) place requirements on employers to ensure that adequate information, instructions and training are provided for waste collection teams, maintenance teams, and their supervisors and managers (see regulation 8: Information and instructions and regulation 9: Training).

58 Clear information, operating instructions and training should be provided for all crews and maintenance teams working with bins and hoists. This should supplement other training provided to reduce the wider risks from waste collection activities.

59 Suitable training may include cascade training from manufacturers and suppliers of bins and hoists, schemes for safety certification of collection teams, or user's in-house non-statutory competence or passport training schemes. Effective training for each individual should include all relevant risks and preventative measures for their work

60 Examples where written method statements and/or training need to be given include, but are not restricted to:

- safe systems for crews on manual handling of receptacles and use of hoists;
- safe systems for maintenance access to hoists for maintenance teams;
- instructions for the lone worker at the rear of the vehicle staffed by a two-man team;
- instructions for crews or maintenance staff on when to refer hoist problems for further advice.

61 Refresher training arrangements should also be considered for both experienced and newer workers, with the opportunity to discuss issues and provide solutions to problems.

62 There is also an obligation upon managers to consult with staff on health and safety issues, especially if there are changes in plant or procedures (see ***Consulting employees on health and safety: A guide to the law***[9]). The contribution of all staff is essential to safe working and it is important that safety representatives and other staff are supported to raise or maintain their level of competence to carry out their duties safely and effectively.

63 They can contribute positively in achieving the desired outcomes by:

- identifying problems;
- indicating whether activities can be carried out safely under prevailing conditions;

- generating sound practical ideas and solutions.

64 Information and training for supervisors should include arrangements for ensuring that the information, instruction and training have been fully understood, taken on by staff and continues to be used. Specific training should be considered for supervisors on how to provide support for collection teams, when a full bin has to be 'refused' for tipping, because the contents are unacceptable.

Appendix 1 Risk assessment

IMPORTANT

This appendix is only a guide. Depending upon your individual activities and organisation's policies, you may need to delete, alter, amend or supplement the contents when devising your own documentation

Type and plant/ref no.

Name of assessor/date of assessment

General description of equipment (vehicle, hoist and waste bin(s)).

Intended function of equipment and suitability for function

Preventing access to dangerous areas

- Is access possible to any equipment that could injure, particularly around the hoist mechanism?
- What access is needed during normal operation of the equipment?

Equipment	Location	Who is at risk?	Potential injury

- For the equipment identified above, what method of protection will be necessary?
- Will this be suitable taking into account the operation of the equipment?

Equipment	Fixed/other guard	Other protective measures – eg: hold-to-run devices	Systems of work

- Where protective measures are provided, are they effective?
- Will they prevent risks from inadvertent operation when more than worker is working with the equipment?

Protective devices/systems	Effective? Eg: ■ of sound construction; ■ not easily by-passed/disabled; ■ adequately distant from danger but allowing a good view of the process where necessary; ■ maintenance access only etc?

Maintaining protective measures

- What maintenance is necessary for the equipment and protective devices?
- What preventative maintenance is required for safety-related parts of the system?

Protective devices/systems	Maintenance	Frequency	Responsible person

Information, instruction and training

What information should be provided to workers and others working with that equipment?	Who is responsible for providing that information?

What instruction and training must be provided to the following?

Workers	Maintenance staff	Supervisors

Who is responsible for providing instruction and training to the following?

Workers	Maintenance staff	Supervisors

Assessor details:

Name .....

Position .....

Date .....

Appendix 2 Collection team/supervisor checklist

1. Risk assessment/method statements for operation seen and understood.

2. Vehicle and hoist in safe operational condition, including records of remedial work in response to fault reports (visual/functional inspection before leaving depot).

3. Ancillary equipment stored on vehicle (eg pole to release bin 'hang–ups').

4. Team members undertaken suitable induction and operational training for this operation (operation of equipment, manual handling of bins, and handling of public/clients, when bins not taken for emptying).

5. Access/surface checked before bin moved; if arrangements for movement unsuitable (eg poor surface or further equipment required), bin left and reported to management, for suitable arrangements to be made.

6. Contents/condition of bin checked before presenting to hoist. If contents/condition of bin unsuitable to lift, bin left and reported to management, for suitable arrangements to be made.

7. Minor faults on vehicle, hoist and bin recorded, for report to management/maintenance crew on return to depot at end of shift.

8. Significant faults, eg with hoist operation and 'hung-ups' which require maintenance intervention, reported to management/maintenance as occur. Additional risk to collection team assessed, and risk-related decision made whether vehicle attended should be attended by maintenance crew or returned to depot for remedial work.

9. Minor faults on vehicle, hoist and bin reported to management/maintenance crew on return to depot.

10. Completed team check sheet returned to supervisor, for review.

Appendix 3 Supervisor checklist

1. Risk assessment/method statements for operation seen and understood by collection team.

2. Team members undertaken suitable induction and operational training for this operation (operation of equipment, manual handling of bins, and handling of public/clients, when bins not taken for emptying).

3. Significant faults, eg with hoist operation, and 'hung-ups' which require maintenance intervention reported to management/maintenance as they occur, additional risk to collection team assessed, and risk-related decision made whether vehicle attended should be attended by maintenance crew or returned to depot for remedial work.

4. Minor faults on vehicle, hoist and bin reported to management/maintenance crew on return to depot.

5. Completed team check sheet returned to supervisor for review.

References

1 *Waste and recycling vehicles in street collection* Leaflet Waste04 HSE 2005 Web-only version available at www.hse.gov.uk/pubns/waste04.pdf

2 BS EN 1501-1: 1998 *Refuse collection vehicles and their associated lifting devices. General requirements and safety requirements. Rear-end loaded refuse collection vehicles* British Standards Institution ISBN 0 580 30172 9

3 BS EN 840-1: 2004 *Mobile waste containers. Containers with 2 wheels with a capacity up to 400 l for comb lifting devices, dimensions and design* British Standards Institution ISBN 0 580 43566 0

BS EN 840-2: 2004 *Mobile waste containers. Containers with 4 wheels with capacity up to 1300 l with flat lid(s), for trunnion and/or comb lifting devices. Dimensions and design* British Standards Institution ISBN 0 580 43568 7

BS EN 840-3: 2004 *Mobile waste containers. Containers with 4 wheels with capacity up to 1300 l with dome lid(s), for trunnion and/or comb lifting devices. Dimensions and design* British Standards Institution ISBN 0 580 43567 9

BS EN 840-4: 2004 *Mobile waste containers. Containers with 4 wheels with capacity up to 1700 l with flat lid(s), for wide trunnion or BG- and/or wide comb lifting devices. Dimensions and design* British Standards Institution ISBN 0 580 43569 5

BS EN 840-5: 2004 *Mobile waste containers. Performance requirements and test methods* British Standards Institution ISBN 0 580 43570 9

BS EN 840-6: 2004 *Mobile waste containers. Safety and health requirements* British Standards Institution ISBN 0 580 43565 2

4 pr EN 1501-5 *Refuse collection vehicles; integration of vehicles, lifting devices and waste bins* (A pr EN is not a publicly available document. A European committee is currently drafting this Standard.)

5 BS EN 349: 1993 *Safety of machinery. Minimum gaps to avoid crushing of parts of the human body* British Standards Institution ISBN 0 580 21394 3

6 BS EN 982: 1996 *Safety of machinery. Safety requirements for fluid power systems and their components. Hydraulics* British Standards Institution ISBN 0 580 26257 X

7 *Lifting Operations and Lifting Equipment Regulations 1998* SI 1998/2307 The Stationery Office 1998 ISBN 978 0 11 079598 0

8 *Provision and Use of Work Equipment Regulations 1998* SI 1998/2306 The Stationery Office 1998 ISBN 978 0 11 079599 7

9 *Consulting employees on health and safety: A guide to the law* Leaflet INDG232 HSE Books 1996 (single copy free or priced packs of 15 ISBN 978 0 7176 1615 2) Web version: www.hse.gov.uk/pubns/indg232.pdf

Further reading

Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21 (Second edition) HSE Books 2000 ISBN 978 0 7176 2488 1

Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22 (Second edition) HSE Books 1998 ISBN 978 0 7176 1626 8

Manual handling. Manual Handling Operations Regulations 1992 (as amended). Guidance on Regulations L23 (Third edition) HSE Books 2004 ISBN 978 0 7176 2823 0

Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice and guidance L113 HSE Books 1998 ISBN 978 0 7176 1628 2

Using work equipment safely Leaflet INDG229(rev1) HSE Books 2002 (single copy free or priced packs of 10 ISBN 978 0 7176 2389 1) Web version: www.hse.gov.uk/pubns/indg229.pdf

Supplying new machinery: A short guide to the law and some information on what to do for anyone supplying machinery for use at work Leaflet INDG270 HSE Books 1998 (single copy free or priced packs of 15 ISBN 978 0 7176 1560 5) Web version: www.hse.gov.uk/pubns/indg270.htm

Buying new machinery: A short guide to the law and some information on what to do for anyone buying new machinery for use at work Leaflet INDG271 HSE Books 1998 (single copy free or priced packs of 15 ISBN 978 0 7176 1559 9) Web version: www.hse.gov.uk/pubns/indg271.htm

Simple guide to the Provision and Use of Work Equipment Regulations 1998 Leaflet INDG291 HSE Books 1999 (single copy free or priced packs of 15 ISBN 978 0 7176 2429 4) Web version: www.hse.gov.uk/pubns/indg291.pdf

The Waste Industry Safety and Health (WISH) Forum exists to communicate and consult with key stakeholders, including local and national government bodies, equipment manufacturers, trade associations, professional associations and trades unions. The aim of WISH is to identify, devise and promote activities that can improve industry health and safety performance.

Further information

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The Stationery Office publications are available from The Stationery Office, PO Box 29, Norwich NR3 1GN Tel: 0870 600 5522 Fax: 0870 600 5533 email: customer.services@tso.co.uk Website: www.tsoshop.co.uk/ (They are also available from bookshops.) Statutory Instruments can be viewed free of charge at www.legislation.gov.uk/.

This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

This document is available web-only at: www.hse.gov.uk/pubns/waste05.pdf

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